In the Claims

The following is a complete listing of the claims and replace all prior claims in the application:

1. (Currently Amended) A method of forming a spin valve sensor, comprising:

forming a ferromagnetic free layer structure that has a magnetic moment;

forming a ferromagnetic pinned layer structure having a magnetic moment;

forming a nonmagnetic conductive spacer layer between the free layer structure and the pinned layer structure;

forming an anti-ferromagnetic pinning layer coupled to the pinned layer structure for pinning the magnetic moment of the pinned layer structure;

forming hard magnetic thin films on both sides of at least a portion of the free layer structure, the ferromagnetic pinned layer structure, the nonmagnetic conductive spacer layer and the anti-ferromagnetic pinning layer; and

forming a hard bias seedlayer structure adjacent to and on opposite sides of at least a portion of the free layer structure, the ferromagnetic pinned layer structure, the nonmagnetic conductive spacer layer and the anti-ferromagnetic pinning layer, wherein the forming the hard bias seedlayer structure comprises forming at least a first layer comprising silicon and a second layer comprising chromium or chromium molybdenum.

2. (Original) The method of claim 1, wherein the forming the anti-ferromagnetic pinning layer further comprising forming a layer of platinum manganese.

3. (Original) The method of claim 1, wherein the forming the hard bias seedlayer structure further comprises forming a layer of tantalum adjacent the silicon layer.

4. (Original) The method of claim 3, wherein the forming a layer of tantalum adjacent the silicon layer further comprises forming the tantalum and silicon layer with equal thickness.

5. (Original) The method of claim 3, wherein the forming a layer of tantalum adjacent the silicon layer further comprises forming the tantalum layer with a thickness half a thickness of the silicon layer.

6. (Original) The method of claim 3, wherein the forming a layer of tantalum further comprises forming a tantalum-chromium alloy layer.

7. (Original) The method of claim 6, wherein the forming the tantalum-chromium alloy layer further comprises forming the tantalum-chromium alloy layer and the silicon layer with equal thickness.

8. (Original) The method of claim 6, wherein the forming the tantalum-chromium alloy layer further comprises forming the tantalum-chromium alloy layer with a thickness half a thickness of the silicon layer.

9. (Currently Amended) The method of claim 1, wherein the forming the hard bias seedlayer structure further comprises forming at opposite sides of at least a portion of the free layer structure, the ferromagnetic pinned layer structure, the nonmagnetic conductive spacer layer and the anti-ferromagnetic pinning layer, a first layer of tantalum, a second layer of silicon and a third layer comprising chromium.

10. (Currently Amended) The method of claim 1, wherein the forming the hard bias seedlayer structure further comprises forming at opposite sides of at least a portion of the free layer structure, the ferromagnetic pinned layer structure, the nonmagnetic conductive spacer layer and the anti-ferromagnetic pinning layer, a first layer of tantalum, a second layer of silicon and a third layer comprising chromium-molybdenum.

11. (Currently Amended) A method of forming a spin valve sensor, comprising:

forming a spin valve structure including a ferromagnetic free layer, a ferromagnetic pinned layer and an anti- ferromagnetic pinning layer;

forming hard magnetic thin films adjacent at least a portion of the spin valve structure on both sides of the spin valve structure; and

forming a hard bias seedlayer structure adjacent to and on opposite sides of at least a portion of the spin valve structure, wherein the forming the hard bias seedlayer structure comprises forming at least a first layer comprising silicon and a second layer comprising chromium or chromium molybdenum.

12. (Original) The method of claim 10, wherein the pinning layer comprises platinum manganese.

13. (Original) The method of claim 10, wherein the forming the hard bias seedlayer structure further comprises forming a layer of tantalum adjacent the silicon layer.

14. (Original) The method of claim 13, wherein the forming a layer of tantalum adjacent the silicon layer further comprises forming the tantalum and silicon layer with equal thickness.

15. (Original) The method of claim 13, wherein the forming a layer of tantalum adjacent the silicon layer further comprises forming the tantalum layer with a thickness half a thickness of the silicon layer.

16. (Original) The method of claim 13, wherein the forming a layer of tantalum further comprises forming a tantalum-chromium alloy layer.

17. (Original) The method of claim 16, wherein the forming the tantalum-chromium alloy layer further comprises forming the tantalum-chromium alloy layer and the silicon layer with equal thickness.

18. (Original) The method of claim 16, wherein the forming the tantalum-chromium alloy layer further comprises forming the tantalum-chromium alloy layer with a thickness half a thickness of the silicon layer.

19. (Currently Amended) The method of claim 11, wherein the forming the hard bias seedlayer structure further comprises forming at opposite sides of at least a portion of the free layer structure, the ferromagnetic pinned layer structure, the nonmagnetic conductive spacer layer and the anti-ferromagnetic pinning layer, a first layer of tantalum, a second layer of silicon and a third layer comprising chromium.

20. (Currently Amended) The method of claim 11, wherein the forming the hard bias seedlayer structure further comprises forming at opposite sides of at least a portion of the free layer structure, the ferromagnetic pinned layer structure, the nonmagnetic conductive spacer layer and the anti-ferromagnetic pinning layer, a first layer of tantalum, a second layer of silicon and a third layer comprising chromium-molybdenum.

21. (Currently Amended) A method of forming a hard bias seedlayer structure, comprising:

forming a first layer comprising silicon adjacent to and on opposite sides of a spin valve structure; and

forming a second layer comprising chromium or chromium molybdenum adjacent to the first layer.

22. (Original) The method of claim 21 further comprising forming a layer of tantalum adjacent the silicon layer.